V. INSTRUCTIONS TO SUBSTITUTE THE CLEAN AMENDED PARAGRAPHS/SECTIONS FOR THE PENDING AMENDED PARAGRAPHS/SECTIONS WITH IDENTIFYING THE PENDING PARAGRAPHS/SECTIONS TO BE REPLACED.

Please substitute the clean amended page 8 of the specification, shown on pages 3 and 4 of this Amendment and submitted herein, for the pending page 8 of the specification that was originally filed. The changes are found on the first two lines on page 8.

Please substitute the clean amended page 13 of the specification, shown on pages 6 and 7 of this Amendment and submitted herein, for the pending page 13 of the specification that was originally filed. The changes are found on the fifth line on page 13.

VI. CLAIMS TO BE CANCELED

Please cancel each and every claim now pending in this patent application.

VII. CLAIMS TO BE ADDED

Please add new claims 77-123 as follows:

77. A method of acquisition and signal transmission through a plurality of spatially distributed locations comprising the steps of:

a) exciting at a low power a physical system with a wide band excitation signal as an input signal;

b) locating a data recorder/processor at spatially distributed locations;

c) interconnecting each said spatially distributed data recorder/processor to an acquisition control computer using a telemetry network;

d) sending a frequency synchronization signal through said telemetry network;

e) simultaneously receiving and recording said wide band excitation input signal in said data recorders/processors at each spatially distributed location;

f) sending said recorded signals to said acquisition control computer via said telemetry network; and,

g) using a stochastic process to derive from said recorded signals a system transfer function for said physical system over the width of said wide band excitation signal.

78. The method of Claim 77 wherein only a single data recorder/processor is used.

79. The method of Claim 77 wherein two data recorder/processors are used.

80. The method of Claim 77 wherein three or more data recorder/processors are used.

81. The method of Claim 77 wherein said telemetry network uses digital signals.

82. The method of Claim 77 wherein said telemetry network uses analog signals.

83. The method of Claim 77 wherein said telemetry network uses fiber optics links.

84. The method of Claim 77 wherein said telemetry network uses radio frequency or microwave links.

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~~85.~~ The method of Claim ~~77~~ wherein said telemetry network uses optical links.

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Cont. 4 ~~86.~~ The method of Claim ~~77~~ wherein said telemetry network uses hard wire links.

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~~87.~~ The method of Claim ~~77~~ wherein said telemetry network uses a daisy chain architecture.

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~~88.~~ The method of Claim ~~77~~ wherein said telemetry network uses a star architecture.

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~~89.~~ The method of Claim ~~77~~ wherein said frequency synchronization signal is integrated with said received and recorded wide band excitation input signals to produce a single signal transmitted through said telemetry network.

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~~90.~~ The method of Claim ~~89~~ wherein said integration is performed via pulse width modulation.

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~~91.~~ The method of Claim ~~89~~ wherein said integration is performed via frequency

division multiplexing.

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92. The method of Claim 89 wherein said integration is performed via time division multiplexing.

93. The method of Claim 89 wherein said synchronization signal is not integrated with the data stream so that two separate signals are transmitted through the said network.

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94. The method of Claim 77 wherein said frequency synchronization signal is not integrated with said received and recorded wide band excitation input signals so that two separate signals are transmitted through said telemetry network.

95. The method of Claim 77 wherein said spatially distributed data recorders/processors down-convert the received signals.

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96. The method of Claim 77 wherein said spatially distributed data recorders/processors store the received signals in digital format.

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97. The method of Claim 77 wherein said spatially distributed data recorders/processors store the received signals in analog format.

Cont

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98. The method of Claim 77 further including the step of inserting one or more waveform synthesizers in said telemetry network.

99. The method of Claim 77 wherein said one or more waveform synthesizers synthesizes a modulated signal about a specified center frequency.

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100. The method of Claim 99 wherein said one or more waveform synthesizers synthesizes a modulated signal about a specified center frequency.

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101. The method of Claim 99 wherein said modulated signal is fully programmable.

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102. The method of Claim 99 wherein said modulated signal is frequency modulated.

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103. The method of Claim ~~99~~ wherein said modulated signal is amplitude modulated.

Cont'd 28 23

104. The method of Claim ~~99~~ wherein said modulated signal is phase modulated.

105. The method of Claim 99 wherein said waveform synthesizer uses up-conversion to shift the modulated signal and its specified center frequency to a new frequency about a new specified center frequency.

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106. A method of estimating the transfer function of a system comprising the steps of:

a) exciting at a low power said system with wide band excitation signals as input signals;

b) distributing data recorders/processors at various locations about said system;

c) interconnecting each said data recorder/processor to an acquisition control computer using a telemetry network;

d) sending a frequency synchronization signal through said

telemetry network;

e) simultaneously receiving and recording said wide band excitation input signals and said frequency synchronization signal in said data recorders/processors at each said location;

f) sending said recorded wide band excitation input signals and said frequency synchronization signal to said acquisition control computer via said telemetry network; and,

g) analyzing said recorded wide band excitation input signals using stochastic processing techniques to estimate the system transfer function.

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~~107.~~ The method of Claim ~~106~~ wherein said system is not physically distributed.

108. The method of Claim 106 wherein said wide band excitation signal consists of ambient radiation.

109. Apparatus for obtaining data for measuring the transfer function of a physical system comprising:

a) a waveform synthesizer for generating a synthesized low-power,

wide band waveform signal and exciting said physical system with said waveform signal as an input signal;

b) a first data recorder/processor for sampling said low-power, wide band input signal;

c) second and third data recorders/processors located at spatially distributed locations within said physical system;

d) digital fiber optic telemetry for digitally interconnecting each of said first, second and third data recorders/processors and said waveform synthesizer;

e) an acquisition control computer connected to said first, second and third data recorders/processors and said waveform synthesizer in a network arrangement;

f) a synchronization signal generator connected to said network arrangement; and,

g) controller means for simultaneously commanding said waveform synthesizer to broadcast said low-power, wide band input signal to excite the physical system and to send a synchronization signal through said network arrangement to cause said first data recorder/processor to sample

said low-power, wide band input signal, to cause said second and third data recorders/processors to measure and record the signals received in said physical system from said low-power, wide band input signal, and to cause said first, second and third recorders/processors to convert said measured and recorded signals received therein to digital format and to send said digital format in synchronized form through said network arrangement to said acquisition control computer for later processing in said acquisition control computer to compute a transfer function.

~~110.~~ The apparatus of Claim ~~109~~ wherein said waveform synthesizer synthesizes a fully programmable 3 MHz modulated excitation signal about a center frequency located in the range of about 0-999 MHz.

~~111.~~ The apparatus of Claim ~~109~~ wherein said waveform synthesizer is adapted to generate a frequency modulated excitation signal.

112. The apparatus of Claim 109 wherein said waveform synthesizer is adapted to up-convert the modulated excitation signal to a modulated excitation signal about a

specified center frequency.

113. The apparatus of Claim 109 wherein said data recorders/processors can record a 3 MHz wide modulated signal centered about any frequency from 0 - 999 MHz.

114. The apparatus of Claim 109 wherein said data recorders/processors use a two-step, down-conversion technique for shifting said excitation signal to a 15 MHz center frequency.

115. The apparatus of Claim 109 wherein said data recorders/processors use a 12-bit analog-to-digital converter sampled at 12 MHz to digitize and store said excitation signal.

116. The apparatus of Claim 109 wherein said network arrangement is configured as a daisy chain digital fiber optics network arrangement.

117. The apparatus of Claim 109 wherein said synchronization signal generator is a 3 MHz local oscillator.

118. The apparatus of Claim 109 wherein said synchronization signal is transmitted through said interconnected digital fiber optic telemetry with an analog bandwidth of 125 MHz.

119. The apparatus of Claim 109 wherein said synchronization signal is integrated with said signals received in said physical system from said low-power, wide band input signal using pulse width modulation.

120. A method of excitation, acquisition and signal transmission through a plurality of spatially distributed locations comprising the steps of:

a) exciting at a low power a physical system with a wide band excitation signal as an input signal;

b) locating a data recorder/processor at spatially distributed locations;

c) interconnecting each said spatially distributed data recorder/processor to an acquisition control computer using a telemetry network;

d) sending a frequency synchronization signal through said

telemetry network;

e) simultaneously receiving and recording said wide band excitation input signal in said data recorders/processors at each spatially distributed location

f) sending said recorded signals to said acquisition control computer via said telemetry network; and,

g) using a stochastic process to derive from said recorded signals a system transfer function for said physical system over the width of said wide band excitation signal.

121. The method of Claim 120 including the further step of storing said simultaneously received and recorded wide band excitation input signal in said data recorders/processors at each spatially distributed location.

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~~122.~~ The method of Claim ~~120~~ wherein said telemetry network is selected from the group consisting of fiber optic links, radio frequency links, microwave links, optical links and hard wiring links.